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**To:** Patent Appeals

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**Date:** October 10, 2007

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## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of Holland et al.

Filing Date: September 21, 2001

Examiner: Ghali, Isis

Serial No.: 09/960,449

Art Unit: 1615

Title: Spray Hydrogel Wound Dressing

Mail Stop Appeal Brief- Patents  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450  
Facsimile 571-273-8300

## APPEAL BRIEF

The following comments are submitted in Appeal of the above referenced patent application. A Notice of Appeal was filed on August 13, 2007. This Appeal Brief is accompanied by the requisite fee set forth in 37 CFR §1.17(c) of \$510.00.

## (1) Real party in interest

The real party in interest in this Appeal is the Assignee, BioCure, Inc.

## (2) Related appeals and interferences

There are no related appeals or interferences.

## (3) Status of claims

Claims 1-4, 8-11, 13-17, 21-23, 25, and 27-29 are pending and on appeal.

## (4) Status of amendments

No claim amendments were filed subsequent to final rejection.

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**(5) Summary of claimed subject matter**

The claimed invention, as recited in independent claim 1, is a hydrogel wound dressing that is formed by spraying a liquid composition onto the wound (page 4, lines 8-10). The liquid composition includes macromers that crosslink to form the hydrogel as they are sprayed upon the wound (page 4, lines 16-19). The macromers have a PVA backbone and one or more pendant crosslinkable acrylamide groups containing olefinically unsaturated groups (page 8, lines 1-15). Crosslinking is initiated using a crosslinking initiator which is not bound to the macromer or to another polymer (page 9, lines 21-26; page 17, line 13; page 19, line 1; and page 20, line 2).

Independent claim 14 recites a method of making a hydrogel wound dressing directly on the wound by spraying a liquid composition onto the wound which crosslinks into the hydrogel as it is sprayed upon the wound (page 4, lines 8-19). The liquid composition comprises water soluble PVA macromers having one or more pendant crosslinkable acrylamide groups containing olefinically unsaturated groups (page 8, lines 1-15) and a crosslinking initiator that is not bound to a macromer or another polymer (page 9, lines 21-26; page 17, line 13; page 19, line 1; and page 20, line 2).

Dependent claims 2 and 15 recite that the wound dressing is degradable (page 5, lines 16-19).

Dependent claims 3, 4, 16, and 17 specify that the composition is delivered using an aerosol or pump spray delivery device (page 10, line 24 – page 11, line 20). Dependent claims 8, 9, 10, 21, 22, and 23 specify that the composition includes an active agent (page 11, line 21 – page 13, line 9). Dependent claim 11 specifies that the dressing debrides the wound when it is removed (page 5, lines 8-15). Dependent claims 13 and 25 specify that the crosslinking is initiated by a redox initiator (page 9, lines 7-20).

**(6) Grounds of rejection to be reviewed on appeal**

(i) Whether claims 1-4, 8-11, 13-17, 21-23, 25, and 27-29 fail to comply with the written description requirement of 35 USC 112, first paragraph.

(ii) Whether claims 1, 2, 8, 9, and 29 are obvious under §103(a) over U.S. Patent No. 6,007,833 to Chudzik et al. (the '833 patent).

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(iii) Whether claims 3, 4, 10, 11, 13-17, 21-23, 25, 27, and 28 are obvious under §103(a) over the '833 patent in view of U.S. Patent No. 6,179,862 to Sawhney et al. (the '862 patent).

The claims stand or fall together.

### **(7) Argument**

**(i) Claims 1-4, 8-11, 13-17, 21-23, 25, and 27-29 comply with the written description requirement**

The claims state that the composition includes a "crosslinking initiator that is not bound to a macromer or another polymer". The Examiner believes that this element is not sufficiently taught by the specification.

It appears that the Examiner is confused by the claim wording. The Examiner objects to the recitation of "the initiator not bound to another polymer", stating that "another polymer" is not disclosed in the specification. The claim actually reads "initiator not bound to a macromer or another polymer"- meaning that the initiator is not bound to the macromer or any polymer other than the macromer. The macromers are polymers (see the definition of macromer on page 4- a macromer is a "macromolecular monomer"). Thus the phrase "another polymer" modifies and refers to the macromer, not a second polymer taught in the specification. The claims at issue are drawn to the use of an unbound initiator, and the specification clearly enables unbound initiator.

To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. See, e.g., *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1319, 66 USPQ2d 1429, 1438 (Fed. Cir. 2003); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563, 19 USPQ2d 1111, 1116 (Fed. Cir. 1991) (MPEP 2163).

The term "initiator" is used in the specification on page 9, lines 22 and 25 (referring to a photoinitiator); page 17, line 13 (referring to a redox initiator); page 19, line 1 (referring to a borate initiator); and page 20, line 2 (again referring to a photoinitiator).

Use of the photoinitiator Irgacure is discussed on page 9, lines 21-26 and in Example 13 and it is clear that the initiator is not bound to the macromer itself, or to another polymer. On page 9, a redox couple initiator is discussed- wherein one solution contains a reducing agent such as a ferrous salt and another solution contains an oxidizing agent such as hydrogen peroxide.

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Obviously neither the ferrous salt nor the hydrogen peroxide is bound to a macromer or other polymer. See also Examples 1-8 and 14-17. The use of borate as an initiator is discussed on page 19 and Examples 9-11. Again, it is clear that the borate initiator is not bound to the macromer itself, or to another polymer. In fact, nowhere in the specification is a bound initiator discussed at all.

Accordingly, it is clear that Applicants have disclosed the use of a polymerizing initiator not bound to the macromer or another polymer. The Applicants do not have to delineate each and every unbound initiator that can be used. Nor does the specification need to have a specific statement that the initiators are unbound to satisfy this requirement. Applicants argue that one skilled in the art would understand that the claim element "crosslinking initiator that is not bound to a macromer or another polymer" refers to initiators such as those specifically disclosed.

**(ii) Claims 1, 2, 8, 9, and 29 are not obvious in view of the '833 patent**

**The '833 patent does not teach or suggest unbound initiator**

The '833 patent teaches a crosslinkable macromer system that can be used as a wound dressing. The system includes two or more polymerizable groups that are pendant on (attached to) a macromer or polymer and one or more initiator groups that are pendant on (attached to) a macromer or polymer. The Examiner agrees that the "initiator group is present as either a pendant group on a polymerizable macromer, or pendant on separate, non-polymerizable polymer backbone" (See the Office Action of October 27 on page 4). Since Applicants' claims are drawn to an unbound initiator (a "crosslinking initiator that is not bound to a macromer or another polymer"), this reference does not teach or suggest the claimed invention.

In fact, the '833 patent specifically teaches that free initiators should be avoided as they can present issues of toxicity, efficacy, and solubility (see col. 2, lines 15-20). To this effect, the initiators are bound to the backbone of either the polymer or macromer. The Examiner points to col. 15, lines 28-31 as support for the proposition that '833 teaches unbound initiator. However, Example 12 is comparing polymer bound initiator with non-polymer-bound initiator and finds that the non-polymer-bound initiator is **NOT AS GOOD**. The '833 patent doesn't state that either polymer bound or non-polymer bound can be used- it states just the opposite. The patent states that unbound initiators should be avoided for various reasons such as toxicity and then

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shows in Example 12 that they don't work as well anyway. This is a text book example of "teaching away".

In the Office Actions, the Examiner points to the teaching in the '833 patent at column 6, line 50 that a reductant can be incorporated into the polymer backbone as evidence that the initiator can be separate from the macromer backbone. This argument is illogical. In fact, the '833 patent teaches that the initiator can be separate from the backbone- as in pendant on the polymer but not incorporated into the backbone- but the whole point of the '833 patent is that the initiator is bound to the macromer or polymer in some manner- whether in the backbone itself, or pendant from the backbone. The initiator is still bound to the macromer or polymer. See also the definition of initiator (col. 4, lines 49-53): "'initiator group" shall refer to a chemical group capable of initiating a free radical reaction, present as either a pendent group on a polymerizable macromer or pendent on a separate, non-polymerizable polymer backbone"

The Examiner further argues (see e.g. the Advisory Action) that the phrase in the '833 patent that the initiator "can be" bound to the polymeric backbone indicates that it "can also not be" bound to the backbone. Applicants do not agree that this refers to unbound initiator. Rather it means that the initiator can instead be bound to another part of the polymer (not the backbone) or to another polymer.

The '833 patent does not teach or suggest spray delivery

Moreover, the '833 patent does not teach a wound dressing formed by spray delivery of a liquid composition. The Examiner's argument is that the '833 patent teaches spray delivery because it does not teach any method of delivery at all ("US '833 teaches the liquid delivery of the composition without excluding or specifying any method of delivery, thus the spraying the [sic] liquid composition into the wound is inclusive in the reference teaching."). In fact, the '833 patent does teach several methods of delivery, none of which are spray delivery- it teaches applying the liquid composition via a catheter (see col. 10, lines 27-29); via syringe (see col. 16, lines 52-59); and via dip coating (see Examples 16 and 17).

A wound dressing formed by spray application of a composition offers several advantages over application of a liquid composition via syringe, catheter, or dipping. See page 3, lines 1-12 of the specification. Spray delivery can increase the penetration of the polymer into

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the wound area thereby potentially making the delivery of active ingredients more efficient. Penetration of the polymer into the wound bed may also aid in debridement of the wound during dressing changes to accelerate the wound healing process. With spray delivery of an in situ polymerizing polymer, a thin coating can be achieved with excellent coverage of the treated area.

(iii) Claims 3, 4, 10, 11, 13-17, 21-23, 25, 27, and 28 are not obvious over the '833 patent in view of the '862 patent

The '833 patent

The '833 patent is discussed above. The Examiner states (page 6 of the Office Action dated 10/27/05) that the '833 patent does not teach spray delivery (as claimed in claims 3, 4, 14-17, 21, and 22); NO as an active agent (claims 10 and 23); redox irradiation (sic) (claims 13 and 25); and debridement of the wound (claim 12).

However, the Examiner next states that the '833 patent teaches spray delivery since it doesn't exclude or specify any method of delivery, and that it teaches NO as an active agent since it teaches delivery of antithrombic drugs. The Examiner also states that the '833 patent teaches UV irradiation to initiate polymerization- which is assumed to be supposedly relevant to redox "irradiation". None of these arguments are valid.

The '862 patent

The '862 patent teaches a method for forming a tissue adherent barrier in situ using a sprayer to deliver crosslinkable fluids. One of the fluids specifically described as suitable in the method is a solution of macromer. However, the only macromer specifically discussed is a PEG-oligolactyl-diacylate macromer which has a PEG core unit, a polyhydroxy acid extension on each end, and an acrylate end group on each end. PEG has only two hydroxyl groups - at each terminus- to which the crosslinkable acrylates can be fastened (see col. 6, ll. 18-32). The claimed macromers, on the other hand, because they are based on PVA, have crosslinkable groups on pendant chains- chains hanging from the backbone. A tremendous advantage of using PVA rather than PEG is that there are many available hydroxyl groups to which crosslinkable or other groups can be attached, and not just two, as in PEG. Thus, the use of PVA as the backbone of the macromers claimed in the present application offers advantages unexpected and unforeseen by the prior art.

BIOCURE 161

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The '862 and '833 patents are cited in combination as rendering the claims obvious. The Examiner argues that the '833 patent teaches the macromers, which is not true, as discussed above. The Examiner states that the '833 patent teaches the initiator can be not bound to the macromer (in other words that they can be bound to the polymer). The Examiner's argument does not take into account that the claims recite an initiator that is "not bound to a macromer or another polymer".

There exists no reason to combine the teachings of the references. In fact, as discussed previously, the '833 patent teaches away from the invention recited in the claims because it specifically teaches using a bound initiator. Moreover, even if the references are combined, the claimed invention does not result. The combined patents do not teach a wound dressing formed by spraying a PVA macromer having one or more pendant crosslinkable groups and using an unbound initiator.

The law requires that there be- in the references themselves- some motivation to combine the references. Nowhere does the '833 patent suggest that it would be beneficial or even possible to spray the composition taught therein and form a wound dressing. Nowhere does the '862 patent teach that it would be beneficial to use a PVA macromer having one or more pendant acrylamide groups containing olefinically unsaturated groups (assuming that this were even taught by the '833 patent).

Specific dependent claims

Claims 4 and 17

Neither the '833 nor the '862 patent teaches the use of a pump spray device. The devices taught in the '862 patent rely upon gas discharge.

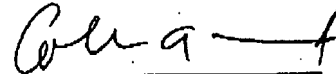
Claims 10 and 23

Neither patent teaches the delivery of nitric oxide (NO) to the wound using the wound dressing.

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The cited references do not teach or suggest the claimed invention. Accordingly, it is respectfully submitted that the claims should be allowed over the art and rejections of record.

Respectfully submitted,

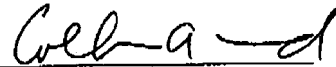


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Collen A. Beard

Date: October 10, 2007

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**Appendix- Listing of Claims Involved in the Appeal**

1. (previously presented) A hydrogel wound dressing formed by spray delivery of a liquid composition to the wound, wherein the composition comprises water soluble PVA macromers having one or more pendant crosslinkable groups and the macromers crosslink to form a hydrogel *in situ* on the wound, wherein the pendant crosslinkable groups are acrylamide groups containing olefinically unsaturated groups, and wherein the composition includes a crosslinking initiator that is not bound to a macromer or another polymer.
2. (original) The wound dressing of claim 1, wherein the hydrogel is degradable.
3. (original) The wound dressing of claim 1, wherein the composition is delivered via an aerosol delivery device.
4. (original) The wound dressing of claim 1, wherein the composition is delivered via a pump spray delivery device.
- 5-7. (cancelled)
8. (original) The wound dressing of claim 1, wherein the composition further contains one or more additives selected from the group consisting of preservatives, biologically active agents, defoamers, wettings agents, leveling agents, hydrating agents, thickeners, fillers, and absorbents.
9. (previously presented) The wound dressing of claim 8, wherein the active agent is selected from the group consisting of growth factors, nitric oxide, antibiotics, anti-inflammatories, analgesics, blood coagulants, and enzymes.
10. (original) The wound dressing of claim 8, wherein the active agent is one which delivers NO to the wound.

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11. (original) The wound dressing of claim 1, wherein the dressing debrides the wound when it is removed.
12. (cancelled)
13. (previously presented) The wound dressing of claim 1, wherein the *in situ* crosslinking is in response to redox initiation.
14. (previously presented) A method of forming a hydrogel wound dressing, comprising the step of applying a composition to a wound via spray, wherein the composition comprises water soluble PVA macromers having one or more pendant crosslinkable groups and the macromers crosslink to form a hydrogel on the wound, wherein the pendant crosslinkable groups are acrylamide groups containing olefinically unsaturated groups and wherein the composition includes a crosslinking initiator that is not bound to a macromer or another polymer.
15. (original) The method of claim 14, wherein the hydrogel is degradable.
16. (original) The method of claim 14, wherein the composition is delivered via an aerosol delivery device.
17. (original) The method of claim 14, wherein the composition is delivered via a pump spray delivery device.
- 18- 20. (cancelled)
21. (original) The method of claim 14, wherein the composition further contains one or more additives selected from the group consisting of preservatives, biologically active agents, defoamers, wettings agents, leveling agents, hydrating agents, thickeners, fillers, and absorbents.
22. (previously presented) The method of claim 21, wherein the active agent is selected from the group consisting of growth factors, nitric oxide, antibiotics, anti-inflammatories, analgesics, blood coagulants, and enzymes.

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23. (original) The method of claim 21, wherein the active agent is one which delivers  
NO.
24. (cancelled)
25. (previously presented) The method of claim 14, wherein the *in situ* crosslinking  
is in response to redox initiation.
26. (cancelled)
27. (previously presented) The wound dressing of claim 1, wherein the crosslinking  
initiator is a redox couple in solution.
28. (previously presented) The method of claim 14, wherein the crosslinking initiator  
is a redox couple in solution.
29. (previously presented) A hydrogel wound dressing formed by spray delivery of a  
liquid composition to the wound, wherein the composition comprises water soluble PVA  
macromers having one or more pendant crosslinkable groups and the macromers crosslink to  
form a hydrogel *in situ* on the wound, wherein the pendant crosslinkable groups are acrylamide  
groups containing olefinically unsaturated groups, and wherein the composition includes an  
unbound crosslinking initiator in solution.

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**Evidence Appendix**

None.

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**Related Proceedings Appendix**

None.